CLAIMS

What is claimed:

1. A spectroscopic diagnostic system for measuring tissue comprising:

a laser emitting radiation in an infrared spectrum;

a fiber optic cable optically coupled to the laser that delivers the infrared radiation to a distal end of the fiber optic cable onto tissue and collects Raman shifted radiation from the tissue for delivery to a proximal end of the cable;

a spectral analyzer that is optically coupled to the fiber optic cable to receive the collected Raman shifted radiation from the fiber optic cable; and

a charge coupled device detector that is optically coupled to the spectral analyzer and that detects radiation received from the spectral analyzer.

2. The system of Claim 1 further comprising a data processor that removes background components from the detected light to provide corrected Raman spectral data and analyzes the corrected Raman spectral data to diagnose a condition of the portion of the tissue.

3. The system of Claim 2 wherein the detector detectes a plurality of Raman shifted frequencies such that the data processor analyzes the plurality of shifted frequencies to diagnose the tissue.

4. The system of Claim 1 wherein the system collects light returning from the tissue for a period of 5 minutes or less.

5. The system of Claim 1 wherein the laser emits light having an average incident power between 2 and 20 mW.

6. A method of spectroscopic diagnosis of tissue of a patient comprising:

irradiating a portion of tissue of a patient to be diagnosed with laser radiation directed onto the tissue through a fiber optic cable;

detecting light emitted by the portion of tissue in response to the radiation with a charge coupled device that is optically coupled to a proximal end of the fiber optic cable, the device collecting the light for a period of 5 minutes or less, the light having a Raman shifted frequency component different from the irradiating frequency;

processing the detected light to provide corrected Raman spectral data to diagnose a condition of the portion of tissue.

7. The method of Claim 6 wherein the detecting step further comprises detecting a plurality of Raman shifted frequency components and background light components and the analyzing step further comprises analyzing the plurality of Raman shifted frequency components to diagnose the tissue.

8. The method of Claim 7 further comprises removing the background light components from the detected light to leave substantially the Raman shifted frequency light components.

9. The method of spectroscopic diagnosis of Claim 6 further comprising coupling the laser radiation from a laser radiation source to a fiber optic cable to transmit the laser radiation onto the portion of tissue.

10. A method of spectroscopic of arterial tissue comprising:

positioning a probe containing a light transmitting fiber optic cable adjacent to a portion of tissue within an artery of a patient to be diagnosed;

directing excitation light onto a portion of tissue, the light having a frequency within an infrared spectral range;

collecting light emitted by the portion of tissue in response to the excitation with the probe for a period of 5 minutes or less, the light having a Raman shifted frequency different from the frequency;

transmitting the collected light to a proximal end of the probe;

detecting the collected light with a charge coupled device that is optically coupled to the proximal end of the probe;

removing background components from the detected light to provide corrected Raman spectral data; and

analyzing the corrected Raman spectral data received at the proximal end to diagnose a condition of the portion of the tissue.

11. The method of spectroscopic diagnosis of Claim 10 wherein the detecting step further comprises detecting a plurality of Raman shifted frequencies and the analyzing step further comprises analyzing the plurality of shifted frequencies to diagnose the tissue.

12. The method of spectroscopic diagnosis of Claim 10 wherein the fiber optic cable receives light from the tissue and delivers the received light to a spectrometer.

13. The method of Claim 10 further comprising providing a laser light source that emits light having an average incident power in a range from 2 to 20 mW.

14. A spectroscopic diagnostic system for analyzing tissue of a patient comprising:

a laser system emitting laser radiation at an excitation wavelength in a range between 750nm and 1050nm;

a fiber optic cable coupled to the laser to deliver the laser radiation to a distal end of the fiber optic cable and onto tissue and to collect Raman shifted radiation having a component wavelength different from said excitation

wavelength that is emitted by the tissue for a period of 5 minutes or less for delivery to a proximal end of the cable;

a spectral analyzer that is optically coupled to the fiber optic cable to receive the collected Raman shifted radiation, the spectral analyzer comprising a spectrometer that generates a spectrum of the collected Raman shifted radiation and a charge coupled device that detects the generated spectrum; and

a data processor that processes the detected Raman shifted radiation to provide corrected Raman spectral data.

15. The system of Claim 14 wherein the laser emits an average incident power in a range from 2 to 20 mW.

16. The system of Claim 14 further comprising a plurality of filters positioned to filter the collected light.

17. The system of Claim 14 wherein the system collects returning light for 8 seconds or less to generate spectral data for a region of interest.

18. The system of Claim 14 wherein the excitation wavelength is in a range of 800 to 900nm.